DOCUMENT RESUME

ED 244 660 JC 840 242

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TITLE High Technology and the Community College: Futures and Constants.
PUB DATE 27 Oct 83
NOTE 20p.; Paper presented at the Annual Conference of the Kansas Association of Community Colleges (13th, Wichita, KS, October 27, 1983).
PUB TYPE Speeches/Conference Papers (150) -- Viewpoints (120)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Educational Change; *Educational Technology; *Futures (of Society); *Instructional Innovation; Social Change; Social Values; *Technological Advancement; Two Year Colleges

ABSTRACT

Education faces a changing environment and many opportunities for using the tools of high technology. It is generally assumed that humans are resistant to change and threatened by mystery and the unknown. In reality, we are accommodating technological change every day, only perceiving it as exotic when it is distant and apart from ourselves. Theorizing and the ability to project, simulate, and analyze via high technology have had a major effect on the extent and speed of current changes. Similarly, theory and high technology will play a major role in education and instruction. New learning theories and the instructional applications of high technology have yet to be fully integrated; and perhaps cannot be within our current educational delivery system. The radical changes that took place in agriculture, transportation, and communication when these technologies reached their natural limit may be foreseen for the future of education. However, some constants must remain central to the purpose and day-to-day life of education, including the importance of little things, of love and caring, of a sense of community and self-renewal, of positive thinking, and of faith in God. These constants must not be forgotten as community colleges apply the new technologies to instructional programs or organizational management. (HB)

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KANSAS ASSOCIATION OF COMMUNITY COLLEGES
13th Annual Conference
Holiday Inn Plaza and Century II
Wichita, Kansas
Thursday, October 27, 1983

"High Technology and the Community College: Futures and Constants"

Dr. Lou Bender, Florida State University

JC 840 242

Introduction

It is a genuine pleasure to be part of this Conference and a privilege to be invited back. The last time I participated in your conference, I arrived during a snowstorm, late at night, dressed for Florida weather and without a topcoat. When I got to the hotel, I was informed all rooms were occupied and that it would be necessary for me to find lodging on the outskirts of the city. Alice Moran took corrective action and I subsequently was assigned to a suite on the top floor of the headquarters hotel. When she invited me for this Conference, she assured me there would be no snowstorm and that I would find a room available upon arrival.

In my judgment, your Conference Planning Committee has chosen a most timely and appropriate theme. Furthermore, the session topics are very strategic to the theme and should give each of you something which is relevant and challenging as you consider your own professional commitment for the years ahead.

In preparing my remarks for today, I attempted to deal with the issue of the "changing environment" for education after which I sought to address some of the challenges and opportunities we in the community colleges might consider.

Finally, I attempted to deal with selected fundamentals or constants which must not be forgotten as we apply the new technologies to our instructional programs or organizational management. Let me begin by discussing the changing environment caused by the new technological age in which we live.

The Changing Environment

A few months ago I was on a flight from Atlanta to Kansas City on a DC-9 Jet, known in the aviation industry as the "sports car version" of commercial aircraft. Just as we made final approach for our landing, the pilot informed the passengers that we would be landing under the direct control of a little black box in the cockpit. He informed us no human hands would be involved during the landing although the crew would be ready if there were any problems. He explained that Delta Airlines and all of the other major airlines are now moving to the next generation of technology in the smaller jet craft as the industry responds to technological changes in quest for increased passenger safety. I had encountered a similar experience about two years ago while flying on a jumbo jet which was on approach to the Los Angeles Airport when the captain informed us we had just landed following a cross-country flight without the aid of human hands.

Interestingly, both incidents resulted in almost identical responses from fellow passengers sitting nearby. The man beside me on the last flight grumbled, "If all those pilots do is sit up there, why should they get such high salaries?" There was even some discomfort reflected on the faces of some passengers

following the announcement as they contemplated the idea of a DC-9 Jet being guided to final landing by a little black box. That situation came to mind as I reflected upon my assignment for today. At the time, I had thought to myself that my fellow passenger had not recognized or appreciated the fact that the human element was still critical to the landing of that plane and that the value of that cockpit crew was reflected in their professionalism by staying up with the newest technology. I wondered how long that crew had been training with that little black box before we were exposed to its use on a flight. I also wondered how many hours each pilot had studied the theory and mechanics of that new technology before attempting to apply it. And finally, I was curious as to the attitudinal resistance individual pilots might have had to the requirement that they master the technology of that little black box.

Our Daily Accommodation of Technology

It is generally assumed that we humans are resistant to change and are threatened by mystery of the unknown. In reality, we are accommodating technological change every day but often perceive it as something distant and apart from ourselves.

The Exotic: The exotic technology described in the literature or shown on TV does create an impression of "future space" and Buck Rogers. Toffler's concept of a cottage industry created by a technology which would enable office workers to carry out their responsibilities while remaining at home seems very distant and very theoretical. Pictures and even TV demonstrations of telephones which will transmit the picture of the caller on a video screen appear to be more for amusement sake

than for any practical future daily use. And the idea of spaceships carrying freight between the U.S. and Europe on a regular schedule by 1985 makes us think of the Buck Rogers comics. Home computers, on the other hand, do not trigger such a far-fetched perspective.

The Common: There are common day-to-day exposures to the new technology which we now take for granted. We no longer even think of television as a new technology. Most of us have never questioned the code found on every check which enables the bank to maintain a log of our sources of income as well as a pattern of our purchases and other business transactions. Through that simple coding device and the use of new technology, it is possible for trained investigators to determine your income, your lifestyle, and even your personality traits. Yet, we take for granted the advent of the new technology and have little difficulty adjusting to some of the exotic technology in that industry such as automated deposits and withrawals or even purchases by credit cards. A similar daily contact with new technology occurs each time we shop and move to the check-out register. We no longer give thought to the reality that as the clerk records our purchases, an automatic recording of each item becomes part of a comprehensive information system that includes a current inventory file which provides that store with an accurate count of every item purchased during the day. At the same time, the store management knows what brands have sold best as well as what numbers and brands must be taken from the stock room in order to replenish the shelves with the amount sold that

day. Yet, through the networking capacity of technology, the corporate headquarters can receive the same information from all of the stores simultaneously generating information to serve top management. By analyzing the data generated from your purchases and those of customers at the other stores, top management can project profit ratios, can categorize buyer preferences and identify the different patterns of reference reflected in one neighborhood or another and even compare the relative success of one store to another. Those in charge of the warehouse or delivery can have an instant list generated which tells what supplies will be needed and at which of the different locations. There are many additional applications we could identify growing out of the simple day-to-day occurrence of taking your groceries to the check-out counter.

In summary, I have attempted to illustrate the dual dimension of the changing environment. On the one hand, we find emerging new technology which seems exotic, theoretical, or distant. On the other hand, deliberate contemplation reveals that we are each confronted with daily contact with new technology which is taken for granted and which does not threaten us in any way. Now, I would like to discuss a conceptual framework for examining the relationship of technology in education.

Why the Changing Environment

Some have asked why the environment is changing so much and so fast. Peter Drucker gives us a clue in his observation that all major advances in our society prior to World War II came as a result of discovery. Since World War II, however, all major

advances have come as a result of the application of **theory!** What Drucker means is that prior to World War II, trial and error essentially needed to be used to test a theory and as a result many discoveries such as electricity were uncovered. But discovery they were!

There are few major problems confronting society today which cannot be solved through the application of existent theory. Our energy crisis, for example, could easily be resolved through attaching a series of barges on the Gulf of Mexico and permitting tide and waves, in response to gravity, to generate the necessary agitation needed for electrical power which could triple the capacity of the Tennessee Valley Authority. By applying such technology on the Pacific, the Great Lakes, and the Atlantic, all of the electrical power needed on this Continent could be produced. But when we ask why it hasn't been done, the answer is simple. Economics!

But when we ask why theory has become so dominant in the major advances of mankind, the answer is also simple. Through the application of our new technology, we can test theories through simulation and close examination. Both the capacity and the speed of the computer, for example, enables us now to project in specific detail each step appropriate to a theory application. The computer can retain all of the sets of data and provide almost instantaneous recall. This is why we talk of the knowledge society to describe the central economy of our future. Trial and error is no longer needed. We can project, we can simulate, and we can analyze with astronomical speed and detail.

A Theory in Education

Now let us examine the role of theory in education and the implications of a technology of instruction. The Servicemen's Readjustment Act of 1944, popularly known as the G.I. Bill, has been credited by some authors with democratizing postsecondary education, making education a right rather than a privilege. Education historians will probably be describing that legislation as landmark or revolutionary for having produced something quite different. In reality, the architects of the G.I. Bill miscalculated the number who would use the educational benefits because the learning theorists of that day had convinced everyone that people begin to atrophy intellectually between the ages 20 and 30. Those over age 30 were perceived as having learned all they would learn in their lifetime for "you cannot teach an old dog new tricks". The experience with the veterans revolutionized learning theory whereby we now think of lifelong learning as not only possible but as mentally and physically beneficial to the individual and to society itself.

Because of our new learning theory, a number of technologists have reconceptualized our approach to instruction. Mager's concept of mastery learning and Skinner's concept of program learning are illustrative of the new technology of instruction in education. We now examine each course from a different perspective than was the pattern historically. We seek to identify each component part needed to make up the whole in such a way that the purpose of that course can be achieved. As we do this, we recognize that some activities require drill and practice while other components of that course will require

synthesis and interpretation. Yet other components will require analysis or application.

High Tech-A Tool: It is at this point that high technology can be examined as an instructional tool. We are learning more and more about the strengths and weaknesses of television as an instructional tool. We recognize the fallacy of those who 20 years ago proclaimed television would replace the teacher in the classroom. Television does provide an excellent vehicle for relating motion and visual reinforcement; yet, it requires the learner to sit passively and the frame-by-frame serial presentation denies any interruption of the instructional sequence. Television has not been effective, therefore, for interactive learning trials involving drill and practice. The computer, on the other hand, provides such drill and practice as well as a variety of feedback capabilities, yet does not offer the visual synthesis of TV. We recognize the benefits of combining these through video disc technology which is rapidly developing as a multiple instructional tool. I'm sure you will see demonstrations at this Conference of some of the exotic technology available to community colleges for both instructional and administrative applications. Some of these tools presently offer only limited benefits because the hardware technology exceeds the software. In other words, the cost of developing a total program for presentation through some of the advanced technology is still too high and too time consuming. Clearly, we are still at the frontier of combining our learning theory with the high tech hardware available to produce the kind of results

we observed from our supermarket check-out registers.

A New Delivey System?

One of the pioneers and recognized leaders in the video disc software field is Dustin H. Heuston, Chairman of WICAT, Incorporated. Heuston argues that every delivery system has a natural limit beyond which additional efficiencies are impossible. He believes education has reached its limit and that restructuring of the educational delivery system will be needed in order for it to accommodate the requirements of a knowledge society. He observed: "The introduction of technology has consistently required a higher educational level for the work force using it, and ironically about the only way the educational delivery system can meet these new demands for requirements is itself to harness technology and generate a more powerful delivery system." He gives as an illustration of the radical changes in delivery system that which took place in agriculture, transportation, and communications. Agriculture became mechanized and now uses high tech in everything from soil and animal nutrition analysis to marketing projections and cost ratios. The average farm worker today uses capital equipment totaling over $70,000 per individual worker.

Transportation transitioned from the use of the horse and sailing vessel to trains, automobiles, and planes. The average plant and equipment cost per airline worker today is over $100,000. For each manufacturing worker there is a $35,000 investment in equipment. Yet, in the office of the professor the capital equipment investment rarely is $2,000 or more. During the next decade, the current educational delivery system will be

upgraded through the introduction of high technology comparable to the transformation that was needed when the printing press provided our earlier technology of the book. Heuston declares, however, that technology will not replace teachers **but help** them in their tasks of providing opportunities for the learner to become more productive in learning. This will be achieved as the microprocesser and the video disc provide the needed individualization of instruction necessary to increase learner productivity.

The computer or microprocesser provides interactive opportunities with the student for endless patient learning trials since computers never tire of having to repeat questions or answers and offer instant and consistent feedback that soothes the learner. The software programs can adjust the instruction and questions in response to the performance of the learner to correspond with the ability level of the learner's current competency. In addition, existent software programs can analyze the learning pattern of the student and offer guidance of the effectiveness of the strategy the student is using. This advice can take into account historical information about the learner's talents and past performance. Software programs also offer diagnostic capability to pinpoint the cognitive problems a student might be encountering. Such programs have been demonstrated to be effective outlining learning strategies relevant to the individual requirements of a student as well as to facilitate such learning strategies. Simulation, drill and practice, replication, random access, and feedback are now made

possible simultaneously in the same room with a group of students on an individualized basis under the direction of the teacher using high tech.

The Constants of Tomorrow

It is exciting to contemplate the seemingly limitless possiblities of using high technology in the future. However, I would call your attention to some constants which I believe you will agree with me must remain central to the purpose and day-to-day life of the community college. They are among the many reasons that technology will not replace the professor. I believe it is reassuring to consider the things which will not change and to re-commit ourselves to the perpetuity of them.

Importance of Little Things: Throughout the future, the importance of little things will not change. A smile, a calm and gentle pat on the back, a moment of courtesy, a thank you---these are the human elements which change the course of life even in moments of crisis. We sometimes forget how important little things can be. Only recently in our development of space craft, we have seen examples of the importance of little things. The absence of changing oil resulted in a delay of the second trip for Columbia. A bolt out of place, a screw that needed tightening, the calculation of a formula--- all of these affect the success of a multi-billion dollar rocket project. The world of tomorrow will continue to be dependent upon the integrity, the thoroughness, and the quality of each person's job. Each of us as individuals will continue to be important. Our reaction to the little things will also remain important.

Importance of Love or Caring: In this society where all

things move with rapidity, the constant of love or caring will remain basic. The constant of family life as a place where basic love and security are formed and where basic values have their beginnings cannot be moved to a less important place. We will find ourselves seeking ways to strengthen this basic unit of society as we find more leisure time and more opportunity to enjoy being with one another.

I have heard John Roueche speak to community college groups in different places throughout the country. As one of our foremost authorities on developmental education, he has carried out numerous investigations on what makes community college developmental studies programs successful. While I have heard John say it in different ways, the basic factor he inevitably identifies as attributable to successful developmental studies is the love or caring that is perceived by the student and transmitted by the faculty member. All learning experiments which have sought to determine the impact of caring as opposed to indifference have clearly demonstrated the critical need and importance of this constant.

A Sense of Community: The third constant is mankind's deep need for a sense of community. It is important that we recognize the basic element which stems from every circumstance where more than one person exists. This is community life. There is an old proverb that says, "One man is no man at all!" There is a story of an only child, lonely and sad, who said to her mother, "Mother I wish I were two puppies so I could play together!" There is an instinct of comradeship and it is as deepseated and original in man as his selfishness.

Martin Luther King, Jr., realized this constant when he said, "With our scientific genius we have made this world a neighborhood; now through our moral and spiritual development we must make of it a brotherhood. In a real sense, we must all learn to live together as brothers, or we will all perish together as fools. We must come to see that no individual can live alone; no nation can live alone. We must all live together; we must all be concerned about each."

Importance of Self Renewal: A fourth constant that will remain is the importance of self renewal. America has become a foremost nation because early in our development we dedicated ourselves to the task of releasing the human mind and spirit. Robert Sherwood pointed out that never before was there a group of political thinkers in any one place, at any one time, more mature, more urbane, better equipped with long-range vision, than the group to whom we refer to devoutly as our "founding fathers". When these men conceived a new nation dedicated to the proposition that all men are created equal, they were planning long-range. The truths that were held to be self-evident in 1776 still are self-evident in 1983 and will be in the year 2083.

Our United States have provided many opportunities leading toward the full achievement of the goal of complete and optimum personal development. While we acknowledge the absolute need for life-long learning to keep up with the changing technology of our society, we also need an opportunity for contemplating our innermost presence. By releasing that inner spirit, we find the zest for life reflected in senior citizens who are young at heart

and vibrant in their activities.

Importance of Positive Thinking: The fifth constant is the reality that positive thinking stimulates and nurtures while negative thinking poisons and embitters. We all know those whose positiveness serves as a model. We admire their spirit and enjoy being in their presence. They see the "half glass full" rather than the "half glass empty". They see the blessings of life and how much better things are than they might be. We also recognize the importance of role models in the development of students of any age. Positive thinking by faculty and administrators together with a sincere sense of caring have made the community college an institution of distinctive character. In reality, an institution is the collective state of mind reflected in the attitudes and values of administrators, faculty, and support staff. Positive thinking is a human condition not possible of a computer.

Importance of Faith in God: The final constant I would identify for the future is the importance of faith in God. Voltaire is quoted as saying, "If God did not exist, it would be necessary to invent him". Down through the ages of history, the faith in the Supreme Being, a willingness to live by moral standards consummate with this faith, and an acceptance of these as an integral part of life have perpetuated and influenced the acts of man. Even when man forgets or even when he denies this faith, he can forget only momentarily and his denial itself is based upon a subconscious belief.

The concern we see on every hand with so-called security can best be assuaged by recognizing that faith in God is the soundest

basis for real security. I do not see how any number of new inventions, electronic or otherwise, can change this fact. I believe this faith and man's recognition and personal expression of it will be a constant in the world of tomorrow.

Any serious student of civilization recognizes historical background and is able to forecast future trends based upon an inherently logical extension of the past. The past has shown that we may expect these constants I have named to be with us and strategic to the future of the educational delivery system of tomorrow. The importance of little things; the importance of love or caring; the importance of community; the importance of self renewal; the importance of positive thinking; and the importance of faith in God... all of these are representative of areas of human life that will not be changed by the rapid technological changes we will be discussing during this Conference and experiencing in the future.

The Challenge To Community Colleges

Community colleges must be committed to a creative response to the changing technological environment of instruction and institutional management. We know our students will be entering a world of reality where knowledge and application of high technology will automatically be expected. In fact, while most community colleges today are concerned with developing computer literacy options for their students and faculty, it is evident that such courses and programs will be obsolete within five years. Elementary school children are already being exposed to the computer in an open and natural process comparable to the

earlier introduction of the textbook in the life of the student of the past. Therefore, our future students will come to us already sophisticated in their understanding and ability to use the tools we have been discussing.

We also know that the benefits to be gained from our learning theory can only be realized through the appropriate use of the technological tools now available to us. Individualization of instruction will accommodate individual differences and not force the faculty to teach toward the average. Mastery learning and accommodation of learning styles will provide for flexibility and ultimately will result in a re-structuring of education.

Our administrative structure of fixed time and variable achievement will be replaced by fixed achievement and variable time. This will be accommoated, however, even when we are dealing with a classroom full of students rather than on a one-to-one level. The cost effectiveness of such an approach will assure society's respect and commitment for the community college as a social institution committed to the student and with learning as its central role.

As we look at the future and hear futurists describe it as the age of the knowledge society, it is clear that the cornerstone of such a society will be education. The question to be answered is whether our formal education system and professional educators will utilize the technology creatively and thus continue to be the vehicle primarily utilized by the public. If we don't, it is predictable that we will be replaced whether by some existent delivery system or a new system yet to be

evolved. The September 26, 1983 issue of **Computer World** reported the establishment of an "electronic university" by Telelearning Systems, Incorporated of San Francisco. This company will be offering 170 courses initially ranging from accounting to marine biology at prices ranging from $35 to $100 per course. Ron Gordon, the company's chairman and former chief executive officer of Atari exclaimed, "The electronic university will bring education to millions and millions of people who were unable to have an education. It will break down the barriers of time and distance for students of all ages." The same article reported that U.S. Secretary of Education T. H. Bell reacted to the announcement as follows: "The thrilling thing about the concept of the electronic university is its flexibility and adaptability and its potential to reach all learners at all levels and to teach them where they are and individualize instruction for every student."

Another example of high tech educational delivery systems can be seen in an announcement of the American Management Association in September that it will offer management courses through the use of personal computers and telecommunications links beginning with five courses for managers and supervisors made available through a network which provides the student an opportunity to interact directly with a live instructor together with a software package. The program began this month and courses cost from $150 to $185 each from AMA.

There is an unusual opportunity for each one at this Conference to look at clear evidence of the changing environment

and the opportunities for using the tool of high technology. I believe you will hear appropriate creative responses which some have already begun to pursue while others are at a point of decision. The sobering reality was well stated by Dr. Ray Clifford of The Defense Language Institute when he observed: "We used to say that computers would replace professors. I no longer believe that. The professor is simply too vital to the teaching process. But we can say with some certainty that professors who use computers will replace those who do not." And I would add to what Dr. Clifford observed that administrators who use computers will replace those who do not.

Finally, I would like to leave a subtle thought with each of you as I conclude my remarks. I'm sure every person in this auditorium can think of an individual who is a senior citizen who radiates zest and vigor because of a positive attitude toward life and a willingness and open-mindedness for continued growth through learning. Perhaps it is a relative or friend or acquaintance who clearly has grasped the essence of the beauty of learning and who is able to enjoy a fuller more meaningful life because of such learning.

We, faculty and administrators need to follow the role model of such an individual as we consider avenues for creatively restructuring our courses of instruction or our administrative management of the institution to serve the technological environment. The professional responsibility for using technology in instruction and administration is comparable to those airline pilots in the cockpit of that Delta flight which landed in Kansas City. Understanding of the tools to assist us

through the array of technological hardware and software requires us to be knowledgeable about their potential and willing to find their appropriate applications in the restructuring of the learning we hope our students will experience.

Thank you very much.

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